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ABSTRACT

This exploratory study examines the relationship of adolescent students' connectedness to school and aspects of their school environment to a teacher-reported mathematics proficiency score using hierarchical linear modeling. School connectedness for this study, is defined as an adolescents' experience of being cared about at school and sense of closeness to school personnel and context. Preliminary results indicated that teacher-reported mathematics proficiency among middle level students is directly explained in part by students' gender, ethnicity, and connectedness to school, and indirectly explained by percent minority students in school and school mobility. (Author)

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School Context, Student Connectedness and Mathematics Classroom Performance

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Abstract

This exploratory study examines the relationship of adolescent students' connectedness to school and aspects of their school environment to a teacher-reported mathematics proficiency score using hierarchical linear modeling. School connectedness for this study, is defined as an adolescents' experience of being cared about at school and sense of closeness to school personnel and context. Preliminary results indicate that teacher-reported mathematics proficiency among middle level students is directly explained in part by students' gender, ethnicity, and connectedness to school, and indirectly explained by percent minority students in school and school mobility.

School Context, Student Connectedness and Mathematics Classroom Performance

Introduction

> When did you begin to write and then evaluate your own work…and each other's work? *Only our own to begin with…Ms. W didn't want anyone being embarrassed…It was supposed to be private until we began to trust our own judgments…When we began to trust ourselves and each other, we were free to ask classmates for opinions…We were to only give specific descriptions of what we saw …No blanket judgments, like good or bad. We were supposed to be honest.* (Stiggins, 2000)

This exploratory study examines the relationship of adolescent students' connectedness to school and aspects of their school environment to a teacher-reported mathematics proficiency score using hierarchical linear modeling. Figure 1 provides a useful heuristic for examining the relationships between school context and student achievement. As Stiggins' example portrays, this sense of student connectedness to peers and teachers, and to learning academic subjects at school is primarily formed in the classroom as an outcome of teacher-to-student and student-to-student interactions. The front face of the cube in Figure 1 illustrates the point that teachers need both the desire and competency to provide relational support to students. This desire and competency to connect students to school is necessary for enhancing students' sense of connectedness to classroom environments, to other students and to the academic goals of schooling. However, the overall context of school may also affect the feeling of connectedness a student experiences in the classroom. The top face of the cube highlights several key aspects of the overall structure of the school environment – resources, organization and leadership. For instance, principals, who provide leadership to faculty and staff by stressing the importance of students' sense of

belongingness to school, may compel teachers to find ways to adapt curriculum, instruction and assessment, as well as adapting their own attitudes and behaviors in the classroom. These types of changes are intended to encourage students to be connected to people at school and to goals for learning important academic concepts and skills. In addition, school mobility and school composition indices, i.e. percent minority students in school, are viewed as important aspects of school organization. These characteristics of school potentially affect how well a student is connected at school and how successful they are in obtaining essential knowledge and skills.

Connectedness at School

Newmann (1981) suggests efforts to reduce alienation or disconnectedness at school are aimed at increasing students': (1) integration with the school context, (2) full engagement in the learning process and (3) sense of connectedness to one another, school personnel and school context. Psychological aspects of alienation, modified for our purposes to imply social disconnection, include: (1) cultural estrangement, the individual's rejection of values commonly held in society, such as the value of a high school education, (2) self-estrangement, the individual's engagement in activities that are not intrinsically rewarding, like taking required curriculum and (3) social isolation, the sense of exclusion from social groups, evidenced by behavioral problems or dropping out (Janosz, LeBlanc, Boulerice, & Treblay, 1997; Jenkins, Patricia H., 1997). Developing a sense of social connectedness at school allows adolescents to

identify with those who are different from them (Lee & Robbins, 1995; Lee, Draper & Lee, 2001). However, adolescents who struggle to feel connected at school begin to feel distant from others, i.e. peers and teachers, and have difficulty accepting social roles and responsibilities of being a student that leads them to greater sense of social isolation at school (Bonny, Britto, Klostermann, Hornung & Slap, 2000; McNeely, Nonnemaker and Blum, 2002). School connectedness for this study, will be defined as an adolescents' experience of being cared about at school and sense of closeness to school personnel and context. Thorpe (2003a) previously found that school-initiated connectedness had an indirect effect on student achievement through peers' desire to be connected to each other and through the individual students' choice of being connected to school.

One source of disconnectedness at school may be student mobility. Student mobility affects students' engagement with schools, which result in increased incidents of misbehavior and lower participation in school activities (Harman, 2002). Kerbow (1996) found that between 30% and 40% of school changes are not associated with residential changes, but are a result such things as suspension and expulsion policies, academic and social climate in school, and overcrowding in schools. Hartman (2002) reported that 76% of students in a Chicago study were motivated to move to a different school due to trouble with peers or teachers, academic difficulties and school safety issues. High student mobility in schools is detrimental for mobile students, stable students and schools (Hartman, 2002; Rumberger, 2002). However, Rumberger emphasized that many

mobile students may also have personal and family problems that contribute to their mobility. For example, Alexander, Entwisle & Dauber (1996) found a negative association of school mobility with test scores, grades, retention and referrals to special education. This association was not subsequently retained however when the researchers took into account prior achievement and background characteristics of the students. Yet Temple and Reynolds also reported that half of the achievement differences between mobile and stable students could be attributed to mobility (Rumberger, 2002). Simpson & Fowler (1994) also found that frequent moves (three or more) predicted grade retention across grade levels. Finally, Rumberger and Larson (1998) found that school mobility between the first and eighth grades, after controlling for other characteristics, increased the odds of dropping out of school. This study will use a school mobility measure as a climate indicator for a school and/or classroom.

Percent of minority students who attend a school is used as a test of the 'frog pond' theory; this theory refers to a specific frog, which may be a small frog in a pond filled with large frogs, or a large frog in a pond filled with small frogs (Hox, 2002). Thus, the 'frog pond' theory emphasizes the role context has in influencing an individual's behavior. From the perspective of our study, a minority student may be connected differently in a school filled with a majority of white students and connected another way in a school filled with a majority of minority students.

Middle School Adolescents

Many adolescents experience a lack of connectedness to peers and teachers at school and with their school environment. They consequently may choose to sacrifice their opportunity to learn knowledge and skills that could enable them to become an integral part of our dynamic society. Middle schools have been society's most powerful force to recapture adolescents drifting in our schools and society (Task Force on Education of Young Adolescents, 1989). Middle schools of today can be considered the place to recapture adolescents who are disassociated from the educational process due to the people or school environment. This analysis is a step forward in understanding our students' sense of connectedness to the people and context of schools in our urban district and how their sense of connectedness impact classroom performance.

Current Study

The current study examines the hierarchical nature of connectedness to school and the relationship of connectedness to classroom academic achievement. Teachers' report of mathematics proficiency is the dependent variable of interest. Prior research has shown that mathematics achievement can be different by gender and ethnicity; therefore we will use gender and ethnicity as covariates of mathematics proficiency. In addition, we believe that a students' sense of connectedness to school is also a predictor of academic achievement. Therefore, the first level (person-level) of our hierarchical model becomes:

Math Prof = Intercept + Gender + Ethnicity + Student-Initiated Connectedness

The second level (organization-level) in our hierarchical model will attempt to: (1) explain differences in average mathematics proficiencies among students across schools (variance in the intercepts for model 1), and (2) to explain any variability across schools in the relationship of mathematics proficiencies to student-initiated connectedness. The level 2 model is:

Intercept = School Mobility + % Minority in School

Student-Initiated Connectedness = School Mobility + %Minority in School

The relationships of gender and ethnicity to math proficiency may also differ by schools and if so they will be added to the level 2 model.

See Thorpe (2003b) for an enhanced discussion regarding the statistical modeling of children's academic development at school. This document emphasizes that academic development occurs over time and thus needs to be modeled accordingly. The analyses presented in this paper present a static view of students' academic development, and though it may provide some indications as to the nature of that development, it is constrained by examining that development at one point in time.

Methods

Subjects

Seventh-grade students (N = 1758) from a mid-western urban school system participated in this study. The sample contained 51.9% females, 36.6% of

the students were on free/reduced lunch plans, and 56.5% of the students were white.

Materials

The Connectedness Survey was given to middle-level students and their teachers. The Connectedness Survey for students contained the subscale Student-Initiated Connectedness. This sub-scale was measured with a Likert scale from 1 to 5, with 1 denoting never and 5 denoting always. This sub-scale included items like "I do my best to learn at school" and had a Cronbach alpha of .82.

The School Mobility index was derived as a continuous variable measuring the overall student mobility as reported by the principal. Percent of minority students in schools was obtained from enrollment figures obtained at the point the survey was given to students.

Student achievement was a teacher-reported measure of math proficiency ranging from "exceeds grade level expectations" to "needs improvement". Teachers rated students' achievement in this domain at the same time the students answered the Connectedness Survey.

Results

Level 1 and Level 2 models were analyzed using HLM 5.04. An intercept-only model was run (a model with no covariates) and the overall variability among the true means on mathematics proficiency was .19. This resulted in an

intraclass correlation of .21 and a reliability of .94 for mathematics proficiency. The intraclass correlation is the ratio of school variance to total variance in the proficiency scores, i.e. within student variability and between school variability. This value of .21 indicates that 21% of the variance in math proficiency scores can be explained by between school variability. The next model run was a level 1 analysis using gender, ethnicity and Student-Initiated Connectedness to predict mathematics proficiency. All three significantly predicted math proficiency, with no variability between schools found for gender and ethnicity. Only the effects of student-initiated connectedness on mathematics proficiency varied across schools in our sample (variability in slopes). In addition, significant variability existed for average mathematics proficiency of students across schools (variability in the intercepts). Therefore, the next model kept level 1 the same, i.e. mathematics proficiency predicted by gender, ethnicity and student-initiated connectedness and added the following predictors to the level 2 model:

Average Math Prof = School Mobility + % Minority in School

Student-Initiated Connectedness = School Mobility + % Minority in School

Results from the third analyses indicated that School Mobility (β = -.76, $p<.0001$) and % Minority (β = -.11, $p<.001$) predicted average mathematics proficiency across schools. Schools with higher student mobility and higher percent minorities had students who scored lower on mathematics proficiency than schools having lower student mobility and percent minority students. School Mobility (β = -.45, $p<.05$) and % Minority in School (β = -.01, $p<.01$) predicted Student-Initiated Connectedness. Schools with higher mobility rates and higher

percents of minority students had students who were less likely to be connected at school. The residual variability for this analysis was .02, therefore our model accounted for 91% of the total parameter variance (.21 - .02)/.21.

Discussion

We hope results from this study will be used to encourage professional educators in our district to persist in finding ways to connect children to the schooling experience, thus enhancing their academic performance. We also want to further develop our understanding regarding issues of school mobility and composition and the implications these characteristics have for academic achievement. Results of our analyses indicate that mathematics proficiency can be explained directly by students' gender, ethnicity and student-initiated connectedness at school. Furthermore, these analyses suggest that students attending schools with higher student mobility and higher percentage minority students tended to score lower on mathematics proficiency and student-initiated connectedness than schools with lower student mobility and percent minority students.

Given the findings of our analyses, we believe that continuing efforts of administrators, teachers and staff towards increasing school connectedness will be fruitful by encouraging students to: (1) integrate with school context by participating in school activities, (2) engage fully in the learning process and (3) build a sense of connectedness to one another, school staff and school activities. However, this is not a simple goal. Various schools in our district have high

student mobility rates, which add to a sense of student disconnect in the schooling process and a diminished record of school performance. In addition, studies need to be developed that look at teachers' sense of connectedness in schools with high student mobility. Our teachers may also need different strategies for developing school connectedness among mobile students than they use for more stable students (Hartman, 2002). Most importantly, if we are to address issues of achievement gaps in our school district, we need to examine issues of connectedness, mobility and achievement among groups of students who attend schools with varying types of composition.

In conclusion, future studies in our school district will examine ways to help all middle level students endorse the goal of a high school education by encouraging connectedness to school curricula that provide knowledge and skills for successful entrance into our society as adults.

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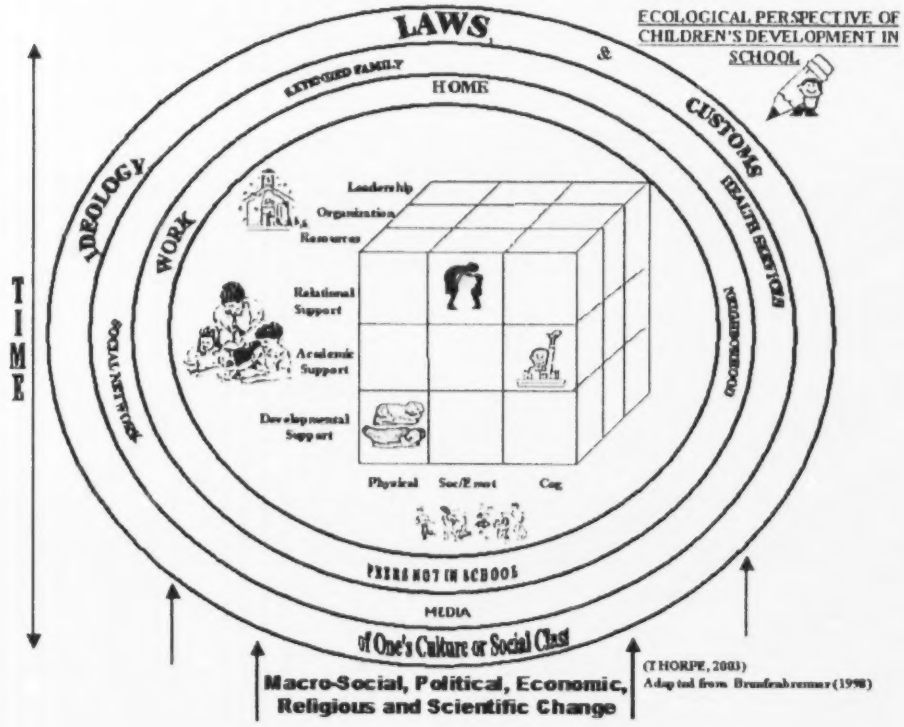
Figure 1. Ecological perspective of children's development in school.



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